

WHAT IS CLAIMED IS:

1                   1.       A semiconductor die package comprising:  
2                   a semiconductor die comprising a vertical power transistor, wherein the  
3 semiconductor die has a first surface and a second surface;  
4                   a source region at the first surface of the semiconductor die;  
5                   a gate at the first surface of the semiconductor die;  
6                   a drain region at the second surface of the semiconductor die;  
7                   a ground plane proximate the second surface and distal to the first surface; and  
8                   a bus member covering a portion the first surface of the semiconductor die and  
9 having at least one leg, wherein the bus member electrically couples the source region of the  
10 semiconductor die to the ground plane.

1                   2.       The semiconductor die package of claim 1 wherein the vertical power  
2 transistor is a vertical diffused metal oxide semiconductor (VDMOS).

1                   3.       The semiconductor die package of claim 1 further comprising:  
2 an isolator layer between the ground plane and the semiconductor die.

1                   4.       The semiconductor die package of claim 1 further comprising:  
2 an isolator layer between the ground plane and the semiconductor die; and  
3 a conductive layer between the isolator layer and the semiconductor die.

1                   5.       The semiconductor die package of claim 1 further comprising:  
2 an isolator layer between the ground plane and the semiconductor die;  
3 a conductive layer between the isolator layer and the semiconductor die; and  
4 a ceramic carrier enclosing the semiconductor die, the bus member, the  
5 isolator layer, and the conductive layer.

1                   6.       The semiconductor die package of claim 1 wherein the vertical power  
2 transistor is a vertical diffused metal oxide semiconductor (VDMOS) RF power transistor.

1                   7.       The semiconductor die package of claim 1 further comprising:  
2 an isolator layer between the ground plane and the semiconductor die;  
3 a conductive layer between the isolator layer and the semiconductor die;

4 a ceramic carrier enclosing the semiconductor die, the bus member, the  
5 isolator layer, and the conductive layer;  
6 a drain lead passing through the ceramic carrier;  
7 a first wire coupling the drain lead to the drain region via the conductive layer;  
8 a gate lead passing through the ceramic carrier; and  
9 a second wire coupling the gate lead to the gate.

1 8. The semiconductor die package of claim 1 further comprising a  
2 matching network electrically coupled to the gate.

1 9. The semiconductor die package of claim 1 further comprising:  
2 an isolator layer between the ground plane and the semiconductor die;  
3 a matching network on the isolator layer;  
4 a conductive layer between the isolator layer and the semiconductor die;  
5 a ceramic carrier enclosing the semiconductor die, the bus member, the  
6 isolator layer, and the conductive layer;  
7 a drain lead passing through the ceramic carrier;  
8 a first wire coupling the drain lead to the drain region via the conductive layer;  
9 a gate lead passing through the ceramic carrier;  
10 a second wire coupling the gate lead to the matching network; and  
11 a third wire coupling the gate to the matching network.

1 10. The semiconductor die of claim 1 wherein gate is a trenched gate.

1 11. A semiconductor die package comprising:  
2 a semiconductor die comprising a vertical power transistor, wherein the  
3 semiconductor die has a first surface and a second surface;  
4 a source region at the first surface of the semiconductor die;  
5 a gate at the first surface of the semiconductor die;  
6 a drain region at the second surface of the semiconductor die;  
7 a ground plane proximate the second surface and distal to the first surface;  
8 a conductive layer between the ground plane and the semiconductor die;  
9 an isolator layer disposed between the conductive layer and the ground plane;  
10 a bus member covering a major portion of the first surface of the  
11 semiconductor die and electrically coupling the source region of the semiconductor die to the  
12 ground plane;  
13 a carrier enclosing the semiconductor die and the bus member;  
14 a drain lead passing through the carrier;  
15 a first electrical conductor coupling the drain lead to the conductive layer and  
16 the drain region;  
17 a gate lead passing through the carrier; and  
18 a second electrical conductor coupling the gate lead to the gate.

1 12. The semiconductor die package of claim 11 wherein the bus member is  
2 a first bus member and wherein the first electrical conductor is a second bus member and the  
3 second electrical conductor is a third bus member, wherein the second and third bus members  
4 each have a pair of legs with different lengths.

1 13. The semiconductor die package of claim 11 wherein the vertical power  
2 transistor is a vertical diffused metal oxide semiconductor (VDMOS) RF power transistor.

1 14. The semiconductor die package of claim 11 further comprising:  
2 a matching network coupled to the gate.

1 15. The semiconductor die of claim 11 wherein the bus member is a first  
2 bus member and wherein the first electrical conductor is a second bus member and the second  
3 electrical conductor is a third bus member, and wherein the first, second, and third bus  
4 members each have a horizontal portion and two legs that are perpendicular to the horizontal  
5 portion.

1 16. A semiconductor die package comprising:  
2 a semiconductor die comprising a vertical power transistor, wherein the  
3 semiconductor die has a first surface and a second surface;  
4 an emitter region at the first surface of the semiconductor die;  
5 a base region at the first surface of the semiconductor die;  
6 a collector region at the second surface of the semiconductor die;  
7 a ground plane proximate the second surface and distal to the first surface; and  
8 a bus member covering a portion the first surface of the semiconductor die and  
9 having at least one leg, wherein the bus member electrically couples the source region of the  
10 semiconductor die to the ground plane.

1 17. The semiconductor die package of claim 16 wherein the bus member  
2 comprises two legs of substantially equal length.

1 18. A semiconductor die package comprising:  
2 a semiconductor die comprising a transistor, wherein the semiconductor die  
3 has a first surface and a second surface;  
4 a source region in the semiconductor die;  
5 a gate in the semiconductor die;  
6 a drain region in the semiconductor die;  
7 a ground plane proximate the second surface and distal to the first surface; and  
8 a bus member covering a portion the first surface of the semiconductor die and  
9 having at least one leg, wherein the bus member electrically couples the source region of the  
10 semiconductor die to the ground plane.

1 19. The semiconductor die package of claim 18 wherein the source region,  
2 the gate, and the drain region are at the first surface of the semiconductor die.